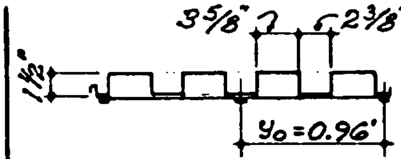
SAMPLE CALCS. NO.3 FOR TYPE A DIAPHRAGM



16-18 GAGE MULTIPLE PLATE DECK, BUTTON PUNCH SEAMS @ 24" o.c., 3 END WELDS.

$t_1 = 0.060 \quad t_2' = 2/3 \times .048 = .032$

$S = \frac{\Sigma y^2}{y_0} = \frac{2 \times .96^2}{.96} = 1.92$

$I_x = .603$

$b = 2' \qquad h = 1.5$

$L_v = 8'\text{-}0" \qquad a = L_v/2$

$n = \frac{4}{2.0'} = 2 \qquad d = 1.92 = 2y_0$

$I_D = 155$

$C_1 = C_2 = C_3 = C_4 = 1$

$$q_3 = \frac{3600 \times .060 \times 4}{8} = 108$$

$$\frac{q_3}{q_2} = \frac{108}{79.6} = > 1$$

(NOTE: q_2 COMPUTED BELOW)

$$K = \frac{1000}{\left\{1 + 1.92\left[\dfrac{1}{\dfrac{(.060+.048)(.060)}{(.048)^2} + 100 \times \sqrt{2} \times (.048)^2 \sqrt{\dfrac{43}{1.5}}\left(\dfrac{.048}{.048+.06}\right)^3}\right]^2\right\}^{1/2}}$$

$$= \frac{1000}{1.1} = 910$$

$$q_1 = \frac{92 \times 1.92 \times .092 \times 910}{2 \times 8} = 920$$

$$q_2 = \frac{8 \times .060^{1/2}}{2}\left\{920\left[\frac{500}{155} + \frac{1}{8 \times 1.92 \times 1.92 (.092)^2}\right]\right\}^{1/2} = 79.6$$

$$q_0 = 920 + 79.6 = 999.6$$

$$\frac{I_x \times 10^6}{2 L_v^2} = \frac{.603 \times 10^6}{2 \times 8^2} = 4711 > 999.6 \ \underline{\text{O.K.}}$$

$q_0 = 1000$ (FIGURE 5-19: $L_v = 8'$, 16-18 ga.)

$$F_1 = \frac{1}{12 \times .108} = 0.77$$

$$F_2 = \frac{2 \times 64}{160}(6.13)\frac{920}{999.6} = 4.51$$

$$F_3 = \frac{R}{8\left[.060 + \left(\dfrac{12.5 \times 4 \times .048^2}{1.5}\right)\right]} = \frac{R}{8 \times .0637} = 1.96R$$

$F = 0.77 + 4.51 + 1.96R = 5.3 + 1.96R$

(FIGURE 5-19: $L_v = 8'$, 16-18 ga.)

Figure 5-20. Continued.

SAMPLE CALCS. NO. 4 FOR TYPE A DIAPHRAGM

$$K = \frac{1000}{\left\{1+3.5\left[\frac{1}{100\times 2(.048)^2\sqrt{\frac{4.5}{1.5}}}\right]^2\right\}^{1/2}} = 796$$

$$q_1 = \frac{92\times 3.5\times .048\times 796.0}{2.5\times 5} = 984.2$$

$$q_2 = \frac{3.33\times 2.5\times .048^{1/4}\times 5.26}{2}\left\{984.2\left[\frac{500}{189}+\frac{1}{5\times 2.5\times 3.5\times .048^2}\right]\right\}^{1/2} = 535$$

$$q_3 = \frac{3600\times .048\times 3.33\times 4.32}{5} = 497.2$$

$$\frac{q_3}{q_2} = \frac{497.2}{535} = .93$$

$$q_0 = (984.2+535).93 = 1413$$

$$\frac{I_x\times 10^6}{2L_v^2} = \frac{.212\times 10^6}{2\times 5^2} = 4240 > 1413 \text{ O.K.}$$

$$F_1 = \frac{1}{12\times .048} = 1.74$$

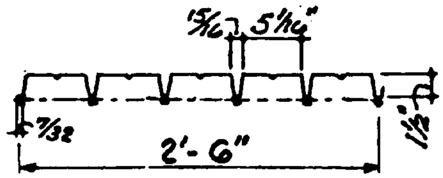
$$F_2 = \frac{2.5\times 5^2\times 1.2}{160}\left[\frac{500}{189}+\frac{1}{5\times 2.5\times 3.5\times .048^2}\right]\frac{984.2}{984.2+535} = 3.84$$

$$F_3 = \frac{R}{5\left(\frac{12.5\times 16\times .048^3}{1.5}\right)} = 13.6R$$

$F = 1.74+3.84+13.6R = 5.58+13.6R$
(FIGURE 5-19 : $L_V = 5'$, 18ga.)

$$q_0 = \frac{10^4}{1.5\sqrt{5\left(5.58+\frac{13.6\times 5}{12}\right)}} = 889.0 < 1413$$

$q_0 = 890$ (FIGURE 5-19 : L_V = 5', 18 ga.)



18 GAGE SINGLE PLATE DECK, 1 1/2" WELDED SEAMS @ 18" o.c.
6 END WELDS

$t_1 = 0$

$t_2 = t_2' = t_3 = .048$

$S = \frac{\Sigma y^2}{y_0} = \frac{2\times .25^2+2\times .75^2+2\times 1.25^2}{1.25} = 3.5$

$I_x = .212$

$b = 2.5$ $\quad h = 1.5$

$L_v = 5'$ $\quad a = 5/1.5 = 3.33$

$n = \frac{10}{2.5} = 4$ $\quad d = 2.5 = 2y_0$

$I_D = 189$ $\quad l_w' = .4 l_w = .4\times 1.5 = .6$

$C_1 = 1$

$C_2 = 40 t_3^{1/4} l_w' = 40\times .048^{1/4}\times .6 = 5.26$

$C_3 = 150 t_3 l_w' = 150\times .048\times .6 = 4.32$

$C_4 = 6/L_v = 6/5 = 1.2$

Figure 5-20. Continued.

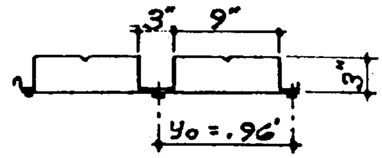
d. Steel decks with concrete fill. This type of diaphragm is composed of a galvanized steel deck with a superimposed fill of concrete having a minimum f_c' of 2,500 psi at 28 days and a minimum weight of 90 pounds per cubic foot. Minimum concrete fill over the deck will be 2½ inches. Temperature reinforcement will be used in the fill with the minimum 6x6—W1.4xW1.4 welded wire fabric. Steel decks less than 1½ inches in depth do not qualify as diaphragms; thus only the concrete is considered as the diaphragm, per paragraph (1) below. To satisfy the anchorage requirements of paragraph 5-7*b*, positive interlocking between the steel deck and the concrete can be achieved by either deck embossments or indentations, transverse wires attached to the deck corrugations, holes placed in the corrugations, or deck profile in which the fluted elements are placed up so that the fill is keyed with the deck. If interlocking between the deck and the concrete is not achieved, then mechanical anchorages will be required to anchor the fill to the supporting member, as prescribed in paragraph 5-7*b*(2).

(1) *Concrete as a diaphragm.* If the diaphragm is loaded and reacted without shear stresses passing through the deck or its attachments, the diaphragm is a concrete diaphragm as described in paragraph 5-7. Typical attachment details are shown in figure 5-22, details A and B.

(2) *Steel deck as a diaphragm.*

(a) Shear capacity. If the diaphragm shears pass through the deck and its attachments, the

SAMPLE CALCS. NO. 5. FOR TYPE A DIAPHRAGM



16-18 GAGE MULTIPLE PLATE DECK, BUTTON PUNCH SEAMS @ 24" o.c. 3 END WELDS.

$t_1 = t_3 = .060$

$t_2 = .048 \quad t_2' = \frac{1}{4} \times .048 = .012$

$S = \dfrac{\Sigma y^2}{y_0} = \dfrac{2 \times .96^2}{.96} = 1.92$

$I_x = 2.35$

$b = 2' \qquad h = 3$

$L_v = 10' \qquad a = L_v/2$

$n = \dfrac{4}{2.0'} = 2 \qquad d = 1.92 = 2y_0$

$I_D = 160$

$C_1 = C_2 = C_3 = C_4 = 1$

$$q_3 = \frac{3600 \times .060 \times 5}{10} = 108$$

$$\frac{q_3}{q_2} = \frac{108}{84.6} = > 1.0$$

(NOTE: q_2 COMPUTED BELOW)

$$K = \frac{1000}{\left\{1 + 1.92\left[\dfrac{1}{2.81 + (.326 \times 3.78 \times .0882}\right]^2 ..\right\}^{1/2}} = \frac{1000}{\sqrt{1 + .226}} = \frac{1000}{1.107} = 904$$

$$q_1 = \frac{92 \times 1.92 (.072)\, 904}{2 \times 10} = 575$$

$$q_2 = \frac{10 \times .060^{1/2}}{2}\left[575\left(\frac{500}{160} + \frac{1}{10 \times 1.92 \times 1.92 (.072)^2}\right)\right]^{1/2} = 84.6$$

$$q_D = (575 + 84.6)\, 1.0 = 659.6$$

$$\frac{I_x \times 10^6}{2L_v^2} = \frac{2.35 \times 10^6}{2 \times 10^2} = 11750 > 659.6 \ \underline{\text{O.K.}}$$

$q_D = 660$ (FIGURE 5-19 : $L_V = 10'$, 16-18 ga.)

$$F_1 = \frac{1}{12 \times .108} \doteq 0.77$$

$$F_2 = \frac{2 \times 10^2}{160}(5.45) \times \frac{575}{660} = 5.94$$

$$F_3 = \frac{R}{10\left(.060 + \dfrac{12.5 \times 4 (.048)^3}{3}\right)} = \frac{R}{10 \times .0618} \doteq 1.62R$$

$$F = .77 + 5.94 + 1.62R = 6.71 + 1.62R$$

(FIGURE 5-19 : $L_V \doteq 10'$, 16-18 ga.)

Figure 5-20. Continued

working shear will be determined by the following formulas—

$$q_D = q_1 + q_6 \qquad \text{(eq 5-27)}$$

where

$$q_1 = \frac{92S(t_1 + t_2')K}{bL_v} \qquad \text{(eq 5-28)}$$

$$q_6 = q_6' + q_6'' \qquad \text{(eq 5-29)}$$

where

$$q_6' = \frac{t_f w^{1.5}\sqrt{f_c'}}{200} \qquad \text{(eq 5-30)}$$

and

$$q_6'' = 2\sqrt{\frac{Kb}{r(t + t_2')}} \qquad \text{(eq 5-31)}$$

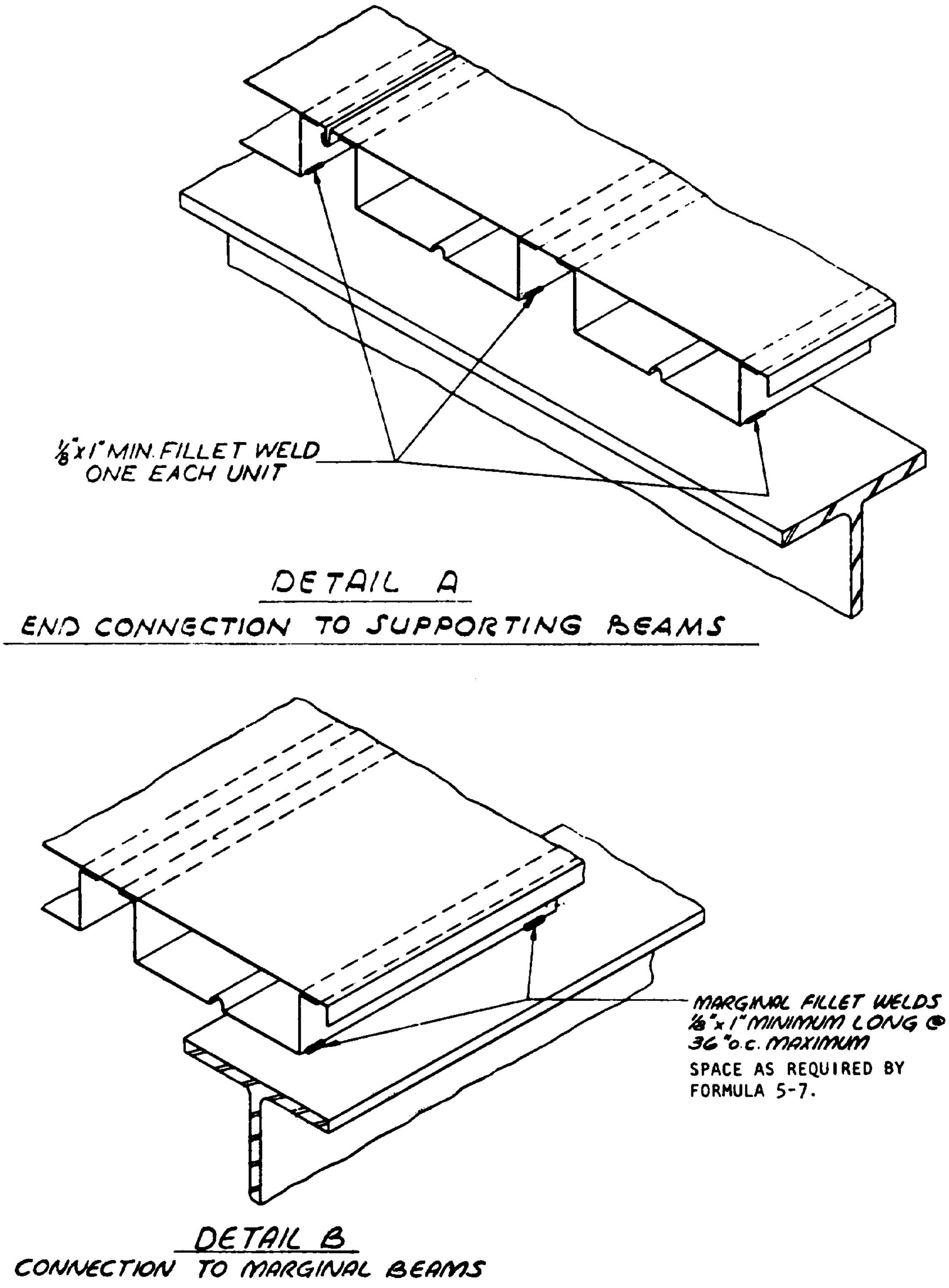


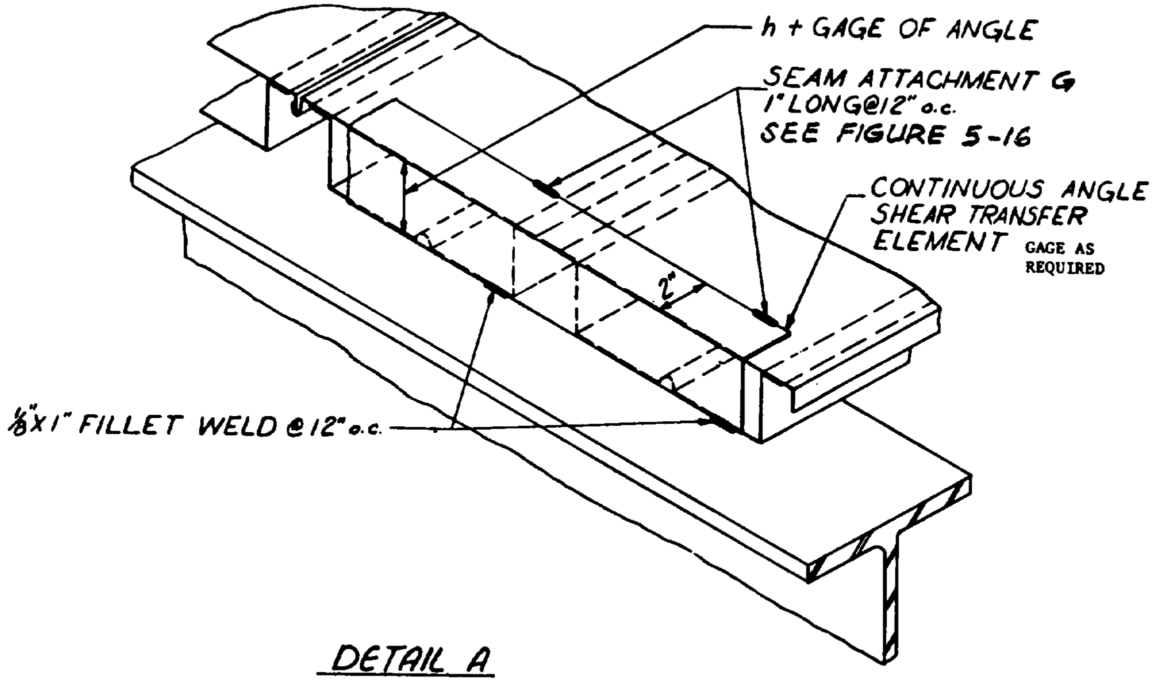
Figure 5-21. Steel deck diaphragms Type B—typical attachments to frame.

(b) Flexibility factor. The flexibility factor, F, will be determined by using the formula

$$F = \frac{20q_6''}{b^2 q_D} \qquad \text{(eq 5-32)}$$

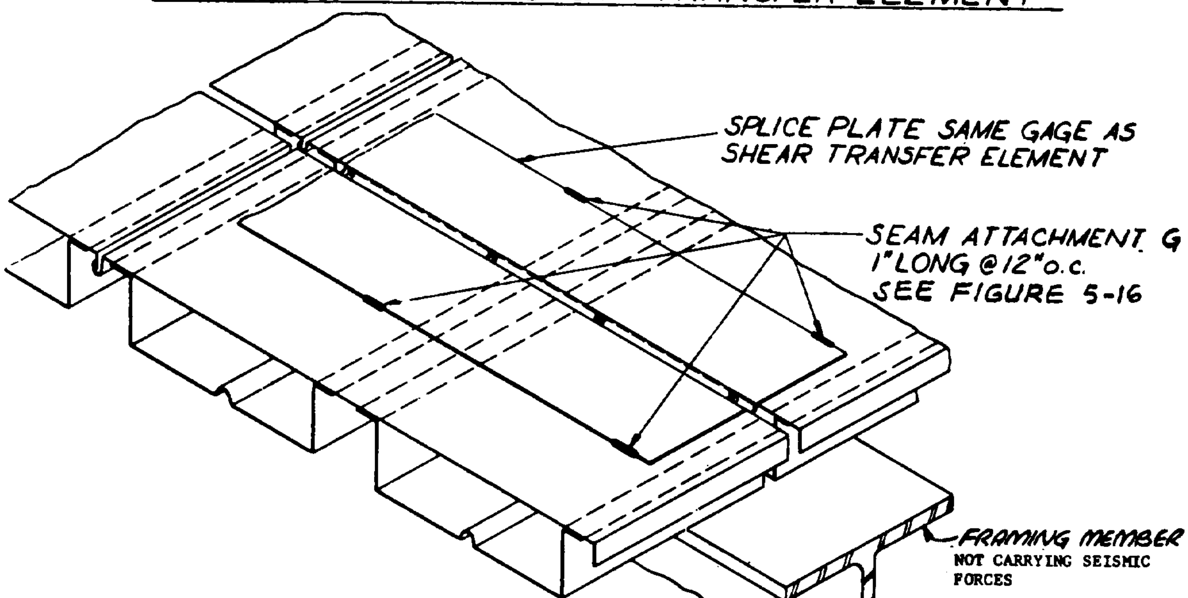
These diaphragms usually fall into the rigid category.

(c) Sample calculation and table. Typical attachment details are shown in figure 5-22, details C and D. A summary of allowable shears (q_d) and flexibilities (F) for a typical cross section is shown in figure 5-22, sheet 2. A solution to the formulas for a typical cross section of this type of diaphragm is given in figure 5-22, sheet 3.



DETAIL A

CONTINUOUS ANGLE SHEAR TRANSFER ELEMENT



DETAIL B

CONTINUOUS SPLICE PLATE

(SEE SHEET 3 FOR CROSS SECTION)

Figure 5-21. Continued

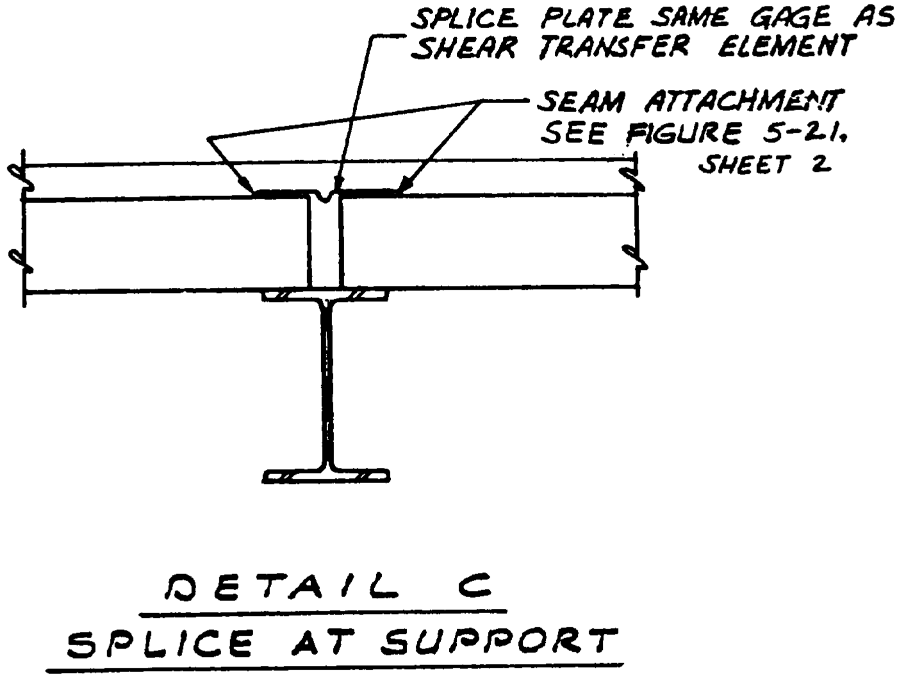


Figure 5-21. Continued.

5-10. Wood diaphragms.

a. General design criteria. Wood diaphragms will be designed with reference to SEAOC 1H2j, SEAOC Chapter 5, and the additional criteria of this section.

b. Wood diaphragms in concrete and masonry buildings. Refer to SEAOC 5C1d.

c. Wood buildings with walls on three sides. Provide for rotation as discussed in paragraph 5-3*b*(2). Straight sheathing will not be used to resist shears in rotation. The depth of the diaphragm normal to the open side will not exceed 25 feet or two-thirds of the diaphragm width, whichever is the smaller depth.

d. Exceptions.

(1) One-story wood-frame structures with the depth normal to the open side not greater than 25 feet may have a depth equal to the width.

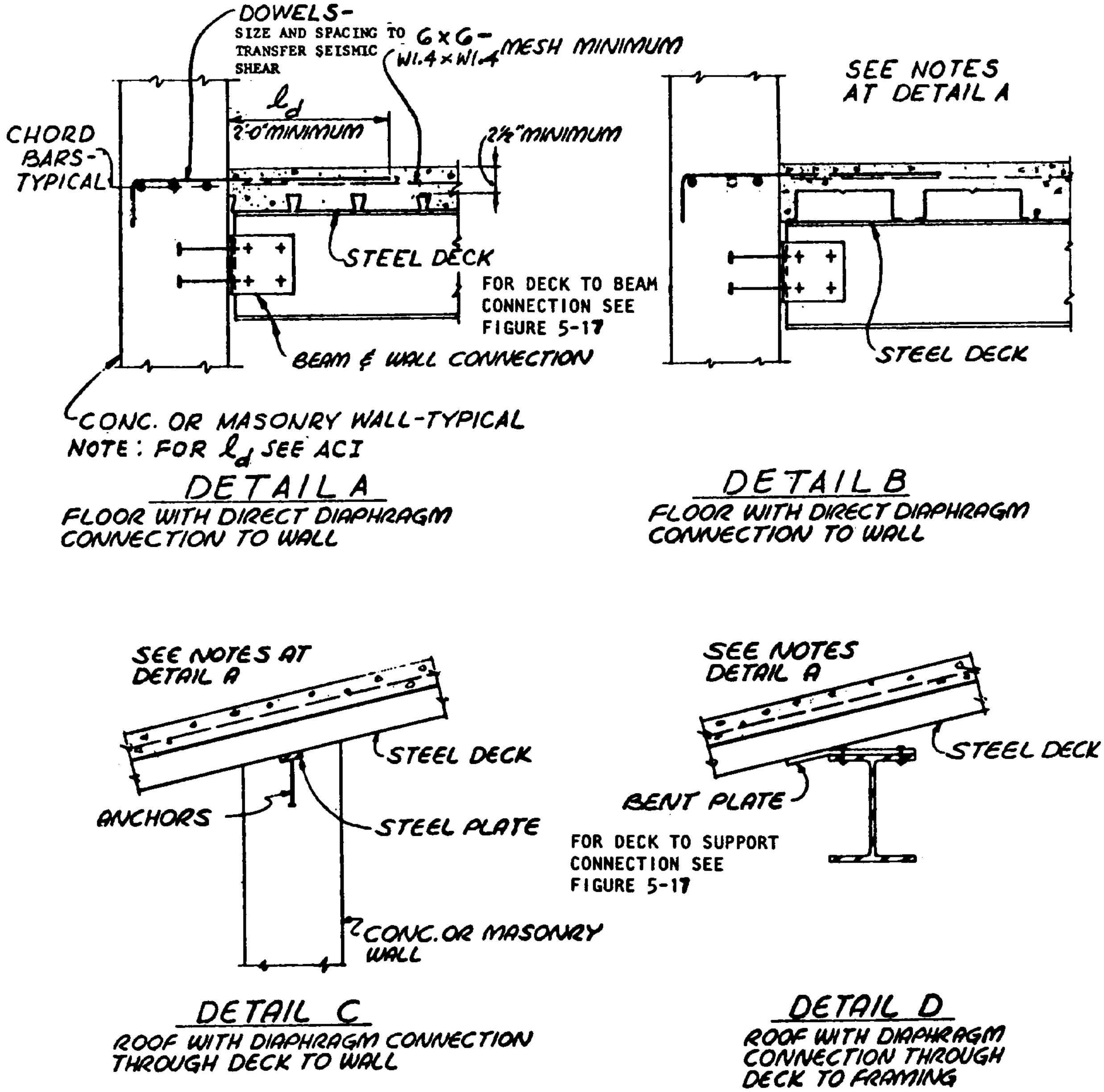
(2) Where calculations show that diaphragm deflections can be tolerated, the depth normal to the open end may be increased to a depth-to-width ratio not greater than 1½:1 for diagonal sheathing or 2:1 for special diagonally sheathed or plywood diaphragms.

e. Material requirements.

(1) *Straight sheathing.* Straight sheathing diaphragms will be constructed of 1- or 2-inch nominal boards, 6 or 8 inches nominal in width, with boards laid at right angles to the rafters or joists. Boards will be nailed to each rafter or joist and to peripheral blocking with two 8d common nails for 1-inch by 6-inch and 1-inch by 8-inch sheathing. For 2-inch sheathing, nails will be three 16d. End joints of adjacent boards will be separated by at least two joist or rafter spaces with at least two boards between joints on the same support. The diaphragm shear value will be as indicated in table 5-2. Diaphragms of this category will have a value of F in the order of 1,500 and will be considered very flexible. They will not be used for the lateral support of masonry, concrete, or other walls that would be seriously affected by high floor-to-floor deflection.

(2) *Diagonal sheathing.* The one-third increase usually permitted on working stresses in seismic design is not applicable to the working shears given in this subparagraph.

(a) Conventional construction. These diaphragms will be made up of 1-inch nominal sheathing boards laid at an angle of approximately 45 degrees to supports. Sheathing boards will be nailed directly to each intermediate bearing member with not less than two 8d nails for 1- by 6-inch boards and three 8d nails for boards 8 inches or wider, and in addition three 8d nails and four 8d nails will be used for 6-inch and 8-inch boards, respectively, at the diaphragm boundaries. End joints in adjacent boards will be separated by at least two joist or stud spaces, and there will be at least two boards between joints on the same support. The boundary or chord members at the edges of diaphragms will be designed to resist direct tensile and compressive chord stresses. Conventional wood diaphragms may be used to resist shears not exceeding 300 pounds per lineal foot of width. Two-inch nominal diagonally sheathed dia-



NOTE: WHEN DECKS ARE ATTACHED AT ALL SHEAR TRANSFER POINTS SIMILAR TO DETAILS A AND B, THE DIAPHRAGMS WILL BE DESIGNED IN ACCORDANCE WITH PARAGRAPH 5-7, CONCRETE DIAPHRAGMS. WHEN SHEAR TRANSFER IS THROUGH THE WELDS BETWEEN THE STEEL DECK AND FRAMING, THE DIAPHRAGM WILL BE DESIGNED IN ACCORDANCE WITH PARAGRAPH 5-9d(2), FORMULAS 5-27 and 5-32.

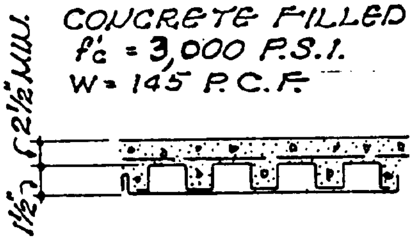
Figure 5-22. Steel deck diaphragms with concrete fill.

phragms may be used with a maximum design shear of 400 pounds per lineal foot if 16d common nails are used in lieu of the 8d nails specified for 1-inch nominal sheathing. This category of diaphragms has a value of F of approximately 250 and will be considered very flexible; such diaphragms will not be used for the lateral support of masonry or concrete walls.

(b) Special construction. Special diagonally sheathed diaphragms will include two adjoining layers of 1-inch nominal sheathing boards laid diagonally and at 90 degrees to each other. Special diagonally sheathed diaphragms also include single-layered diaphragms, conforming to conventional construction and which, in addition, will have all elements designed in conformance with the following provision: Each chord or portion thereof may be considered as a beam loaded with a uniform

TABLE OF ALLOWABLE SHEAR (q_D) AND FLEXIBILTY FACTOR (F)

SECTION	GAGE		SPAN (L_V) 4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	9'-0"	10'-0"
CONCRETE FILLED f'_c = 3,000 P.S.I. W = 145 P.C.F.	20-20	q_D	2780	2510	2340	2210	2120	2040	1980
		F	.47	.53	.56	.59	.62	.66	.66
	18-18	q_D	3190	2830	2600	2430	2300	2200	2130
		F	.36	.40	.44	.47	.50	.51	.53
	16-16	q_D	3600	3160	2870	2660	2500	2380	2280
		F	.28	.32	.36	.38	.41	.43	.45
	16-18	q_D	3440	3030	2760	2560	2420	2310	2220
		F	.31	.35	.38	.41	.44	.46	.48



NOTES:
1. BUTTON PUNCH @ 36" O.C.
2. THE GAGES FOR MULTIPLE SHEET DECKS ARE DESIGNATED WITH THE GAGE OF THE FLAT SHEET FIRST AND FLUTED SHEET SECOND.
3. DECK SECTIONS ARE MADE FROM GALVANIZED SHEETS
4. END WELDS CONSIST OF 3 PUDDLE WELDS AT EACH SUPPORT.

Figure 5-22. Continued.

load per foot equal to 50 percent of the unit shear due to diaphragm action. The load will be assumed as acting normal to the chord in the plane of the diaphragm and either toward or away from the diaphragm. The span of the chord, or portion thereof, will be the distance between structural members of the diaphragm, such as joists or blocking, which serve to transfer the assumed load to the sheathing. Special diagonally sheathed diaphragms may be used to resist shears due to seismic forces, provided such shears do not stress the nails beyond their allowable safe lateral strength and do not exceed 600 pounds per lineal foot of width. For approximating deflections, a value of F of 75 will be used. Thus special diagonally sheathed diaphragms fit into the category of flexible diaphragms.

(3) *Plywood sheathing.*

(a) Boundary members. All boundary members will be proportioned and spliced where necessary to transmit direct stresses. The nominal width of the framing members will be at least 2 inches. In general, panel edges will bear on the framing members and butt along their centerlines. Nails will be placed not less than **d** inch in from the panel edge, not more than 12 inches apart along intermediate supports, and 6 inches along panel edge bearings and will be firmly driven into the framing members. No unblocked panels less than 12 inches wide will be used.

(b) Stiffness. The stiffness of plywood diaphragm webs varies with the thickness of the plywood, the nailing, and the joint blocking. These variables also occur in the determination of the working shear values of the diaphragm. An F value for determining the stiffness category and for estimating deflections will be determined using the following formula:

$$F = \frac{33{,}000\ q_{ave}}{q_D^2} \qquad \text{(eq 5-33)}$$

where

q_D = allowable shear specified in table 5-6 in pounds per foot

(c) Flexibility. For plywood diaphragms the tabular values of q_D range from 110 pounds per foot to 820 pounds per foot. From this, the value of F can be determined to range between 300 and 20. Thus, plywood diaphragms can be very flexible, flexible, or semiflexible diaphragms depending on the selection of the type of diaphragm to be used.

(d) Nailing. The use of pneumatically or mechanically driven steel wire staples with a minimum crown width of $^7/_{16}$ inch is an acceptable alternative method of attaching diaphragms. The crown of the staple must be installed parallel to the framing member.

SAMPLE CALCS NO. 6 FOR TYPE A DIAPHRAGM WITH CONC. FILL

$$q_D = q_1 + q_6$$

$$q_1 = \frac{92S(t_1 + t_2')K}{bL_v} \qquad K = 1{,}000$$

$$q_6 = q_6' + q_6''$$

$$q_6' = \frac{t_f w^{1.5}\sqrt{f_c'}}{200}$$

$$q_6'' = 2\sqrt{\frac{Kb}{d(t_1 + t_2')}}$$

$$q_1 = \frac{92 \times 1.92(.06 + .032)1{,}000}{2 \times 6} = 1354.2$$

$$q_6' = \frac{2.5 \times 145^{1.5}\sqrt{3{,}000}}{200} = 1195$$

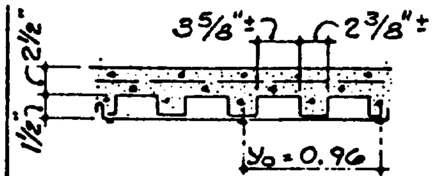
$$q_6'' = 2\sqrt{\frac{1000 \times 2}{1.92(.06 + .032)}} = 212.8$$

$$q_D = 1354.2 + 1195 + 212.8 = 2762$$

$(q_D = 2760$ IN FIGURE 5-22 FOR $L_v = 6'$ AND GAGE = 16-18)

$$F = \frac{20 q_6''}{b^2 q_D} = \frac{20 \times 212.8}{2^2 \times 2760} = .385 \text{ (SEE FIGURE 5-22, 2 of 3)}$$

SAY 38



16-18 GAGE MULTIPLE PLATE DECK WITH 2 1/2" CONC. FILL. 3 END WELDS

$t_f = 2.5"$

$t_1 = .060 \qquad t_2' = 2/3 \times .048 = .032"$

$$S = \frac{\Sigma Y^2}{Y_0} = \frac{2 \times .96^2}{.96} = 1.92$$

$I_x = .603$

$b = 2' \qquad h = 1.5"$

$L_v = 6'\text{-}0" \qquad d = 1.92 = 2y_0$

$n = \frac{4}{2}, = 2$

$w = 145$ PCF $\qquad f_c' = 3{,}000$ PSI

Figure 5-22. Continued.

Common Wire Nail	Staple	Minimum Staple Penetration in Framing Member
6d	14 gauge	1 inch
8d	13 gauge	1 inch
10d	12 gauge	1 1/8 inch

e. Typical details. Refer to figure 5-23.

5-11. Horizontal bracing.

a. Diaphragms. Diaphragms may be made of horizontal steel bracing. Usually the bracing consists of members added at the top or bottom plane of a system of floor or roof trusses or beams. Transverse elements are added for components perpendicular to the trusses or beams, and diagonal members are added to form a triangulated plane of bracing. As with other kinds of diaphragms, the design force will be obtained from SEAOC 1H2j. The bracing members and connections will be treated like vertical braced frames under SEAOC 4G.

b. Secondary bracing. Components of the horizontal bracing system should be coordinated with bridging and other bracing members that are provided for lateral bracing of trusses and girders, for steadying columns, and for transferring lateral forces to other systems at a lower level.

Recommended Shear (pounds per foot) for Horizontal APA Panel Diaphragms with Framing of Douglas-Fir, Larch or Southern Pine[a] for Wind or Seismic Loading

Panel Grade	Common Nail Size	Minimum Nail Penetration in Framing (inches)	Minimum Nominal Panel Thickness (inch)	Minimum Nominal Width of Framing Member (inches)	Blocked Diaphragms				Unblocked Diaphragms	
					Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6)[b]				Nails Spaced 6" max. at Supported Edges[b]	
					6	4	2½[c]	2[c]	Case 1 (No unblocked edges or continuous joints parallel to load)	All other configurations (Cases 2, 3, 4, 5 & 6)
					Nail Spacing (in.) at other panel edges (Cases 1, 2, 3 & 4)					
					6	6	4	3		
APA STRUCTURAL I grades	6d	1-1/4	5/16	2 3	185 210	250 280	375 420	420 475	165 185	125 140
	8d	1-1/2	3/8	2 3	270 300	360 400	530 600	600 675	240 265	180 200
	10d[d]	1-5/8	15/32	2 3	320 360	425 480	640 720	730 820	285 320	215 240
APA RATED SHEATHING, APA RATED STURD-I-FLOOR and other APA grades except Species Group 5	6d	1-1/4	5/16	2 3	170 190	225 250	335 380	380 430	150 170	110 125
			3/8	2 3	185 210	250 280	375 420	420 475	165 185	125 140
	8d	1-1/2	3/8	2 3	240 270	320 360	480 540	545 610	215 240	160 180
			7/16	2 3	255 285	340 380	505 570	575 645	230 255	170 190
			15/32	2 3	270 300	360 400	530 600	600 675	240 265	180 200
	10d[d]	1-5/8	15/32	2 3	290 325	385 430	575 650	655 735	255 290	190 215
			19/32	2 3	320 360	425 480	640 720	730 820	285 320	215 240

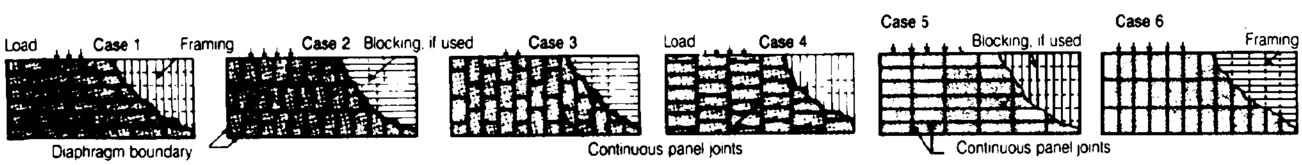
(a) For framing of other species: (1) Find species group of lumber in NFPA National Design Spec. (2) Find shear value from table above for nail size for Structural I panels (regardless of actual grade). (3) Multiply value by 0.82 for Lumber Group III or 0.65 for Lumber Group IV.

(b) Space nails 12 in. oc along intermediate framing members (6 in. oc when supports are spaced 48 in. oc). (Applicable building codes may require 10 in. oc nail spacing at intermediate supports for floors.)

(c) Framing at adjoining panel edges shall be 3-in. nominal or wider, and nails shall be staggered where nails are spaced 2 inches oc or 2-1/2 inches oc.

(d) Framing at adjoining panel edges shall be 3-in. nominal or wider, and nails shall be staggered where 10d nails having penetration into framing of more than 1-5/8 inches are spaced 3 inches oc.

Notes: Design for diaphragm stresses depends on direction of continuous panel joints with reference to load, not on direction of long dimension of sheet. Continuous framing may be in either direction for blocked diaphragms.



Note: Table 5-6 is reprinted, with permission, from Table 32 in APA DESIGN/ CONSTRUCTION Guide, © 1990 American Plywood Association.

Table 5-6. Horizontal diaphragm shear.

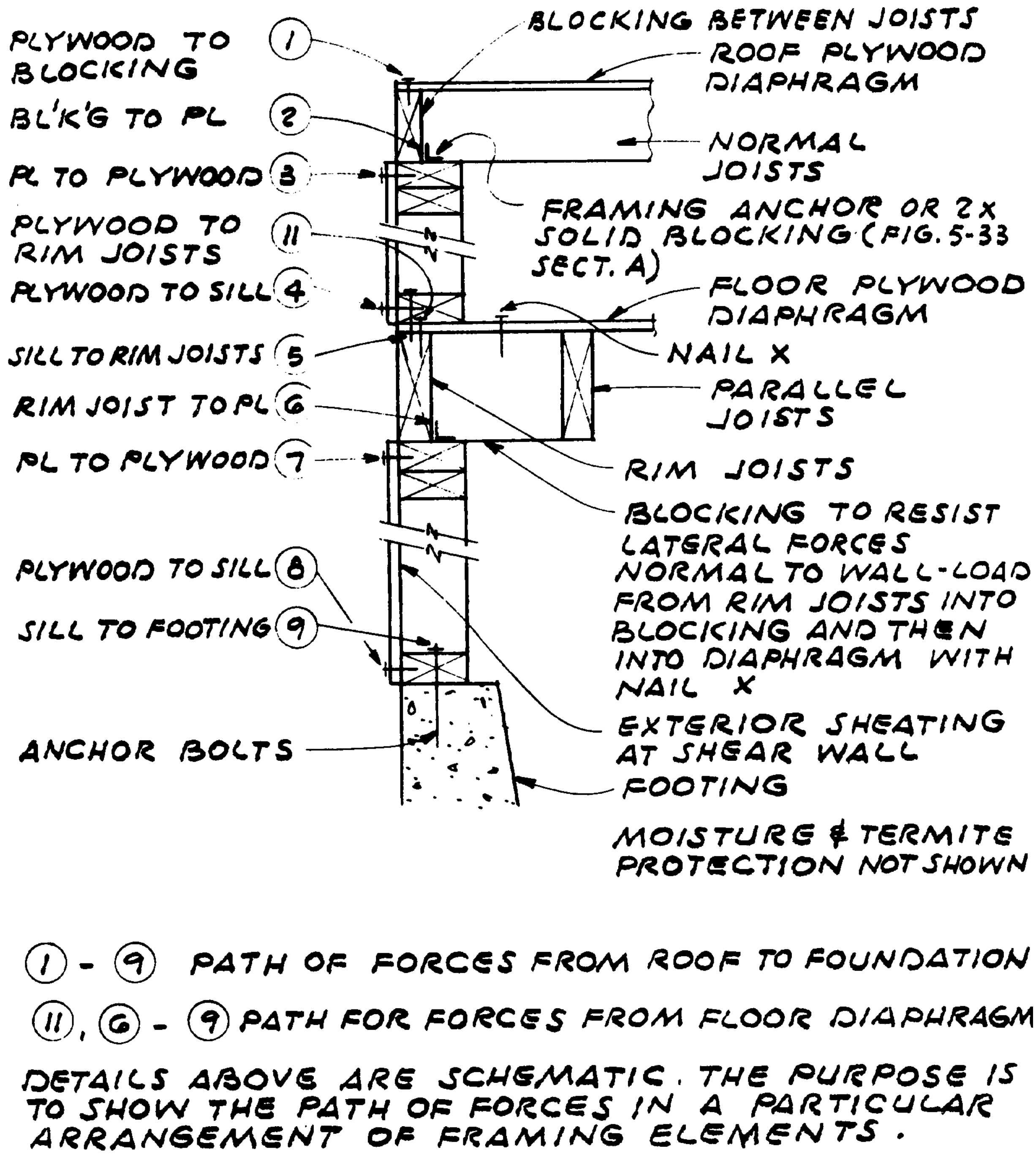


Figure 5-23. Wood details.

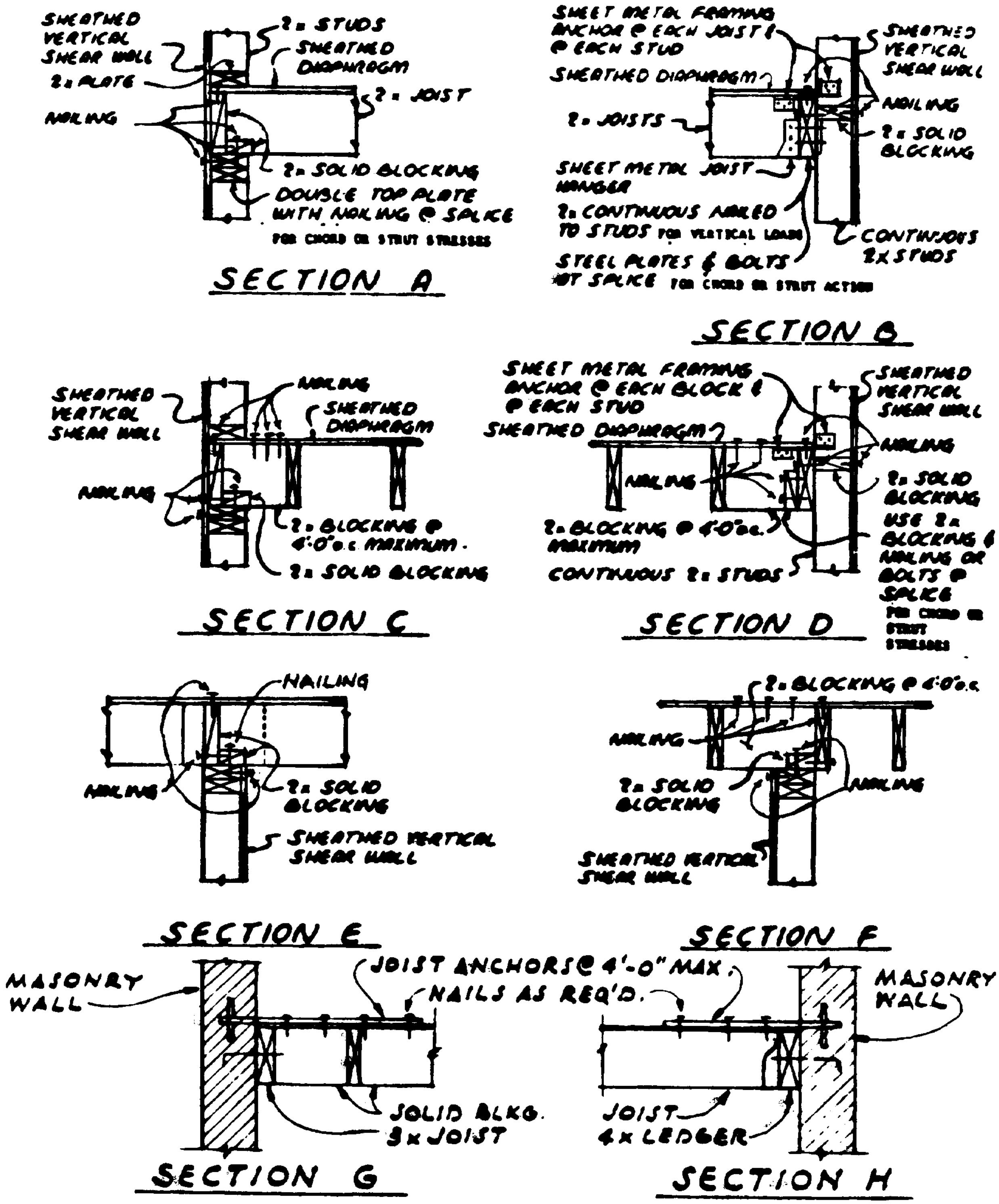
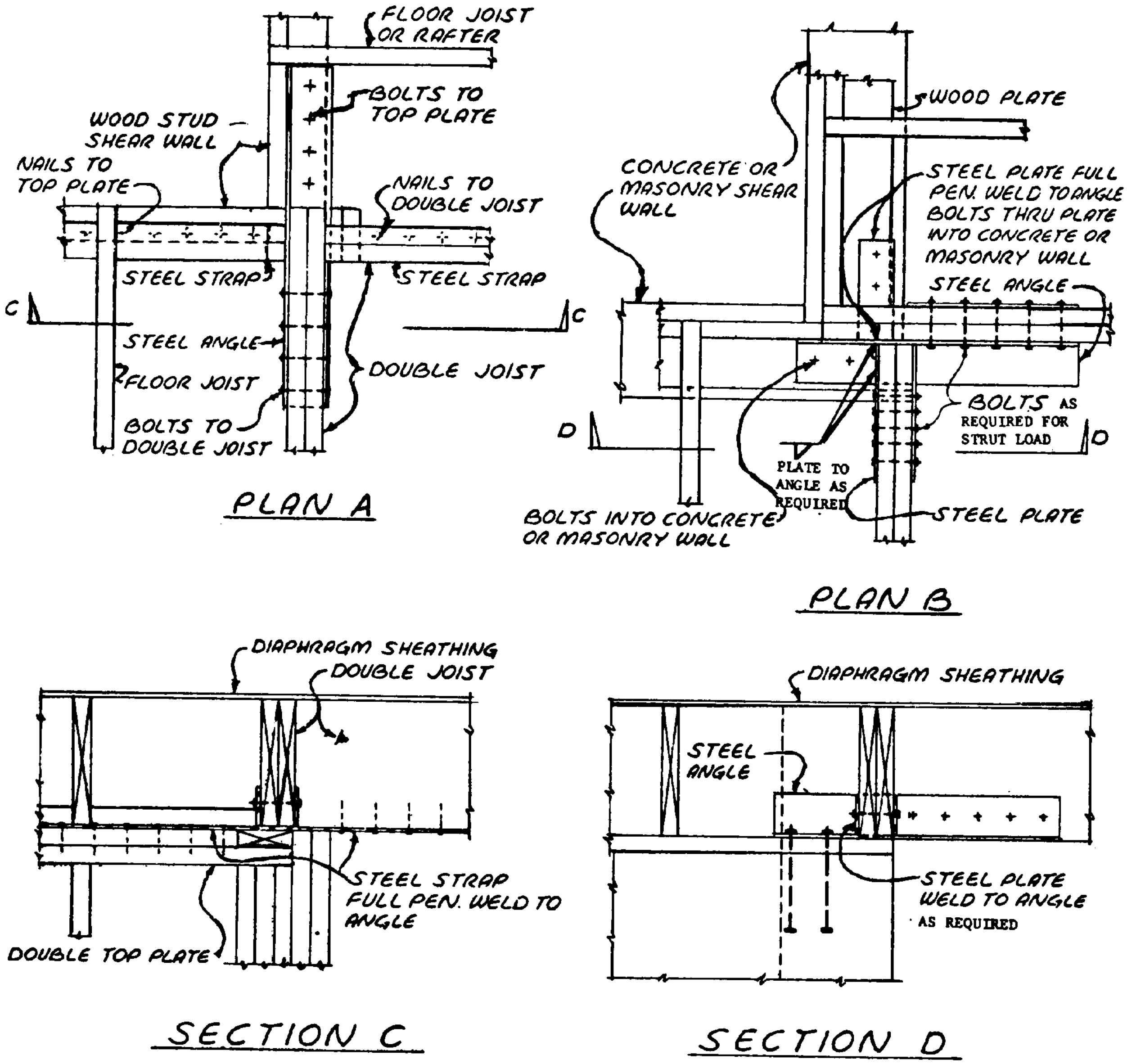


Figure 5-23. Continued.



NOTE:
BOLTS AND NAILING TO BE DESIGNED FOR DIAPHRAGM STRUT OR CHORD LOADS. ROOF CONNECTIONS WILL BE SIMILAR BUT MODIFIED BECAUSE OF ROOF SLOPE.

Figure 5-23. Continued.

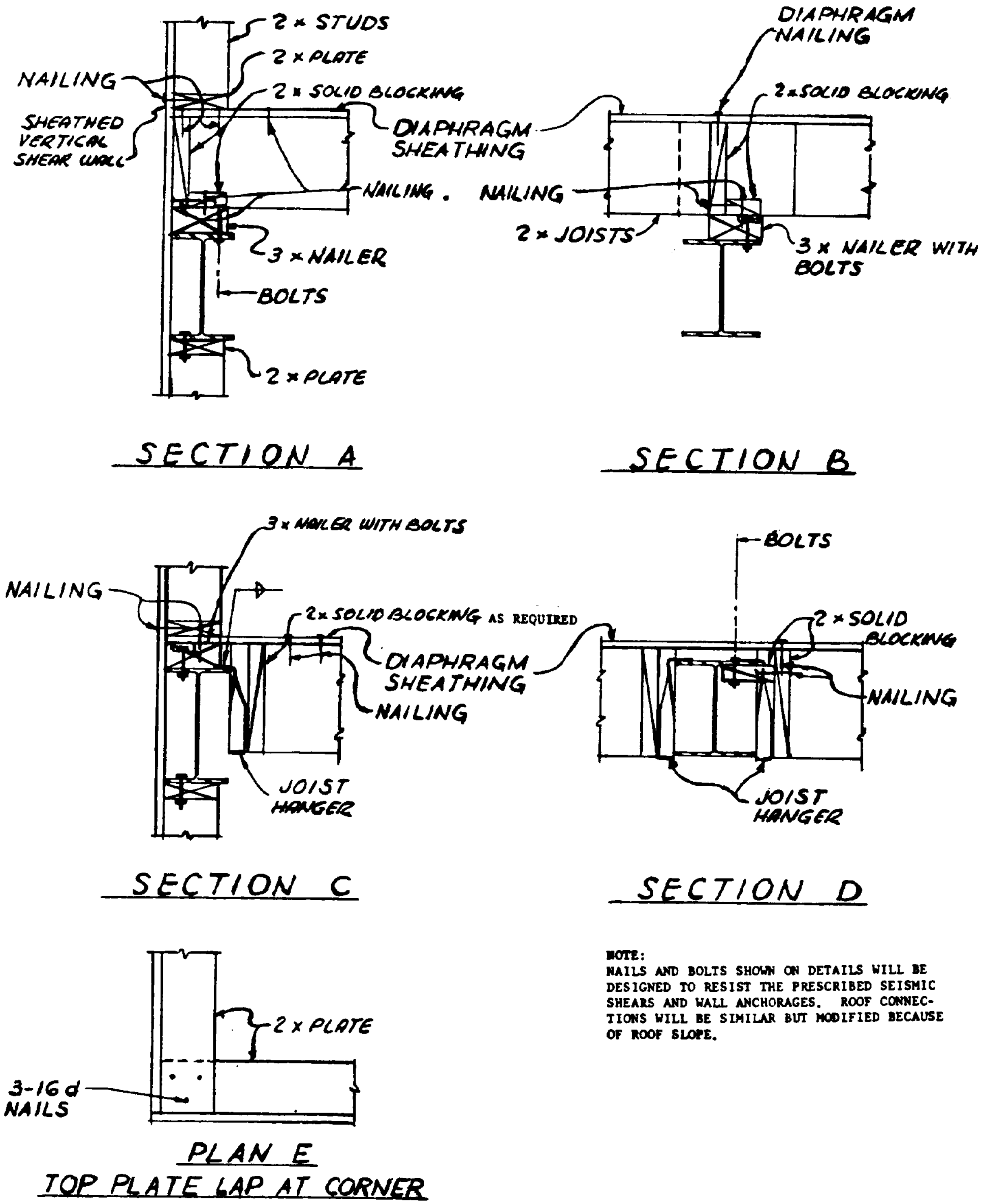


Figure 5-23. Continued.